DOCUMENT RESUME

ED 326 967 EA 022 520

TITLE Education and Training after the Compulsory Years: Buildings, Equipment and Links with Industry. Report of a Symposium Held in Espoo (Finland, May 14-17, 1990).

INSTITUTION Organisation for Economic Cooperation and Development, Paris (France). Programme on Educational Building.

REPORT NO SME-PEB/90.9

PUB DATE 90

NOTE 34p.

PUB TYPE Collected Works - Conference Proceedings (021) -- Guides - Non-Classroom Use (055)

EDRS PRICE MF01 Plus Postage. PC Not Available from EDRS.

DESCRIPTORS Building Design; *Educational Facilities; *Educational Facilities Planning; Equipment; Facility Case Studies; Postsecondary Education; School Buildings; School Expansion; Secondary Education

IDENTIFIERS *Organisation for Economic Cooperation Development

ABSTRACT

Trends in postcompulsory education are examined and strategies are suggested for effective provision of buildings and equipment in this summary of a symposium organized by the Organisation for Economic Cooperation and Development (OECD) Programme on Educational Building and the Ministry of Education, Finland. Although participating countries' programs are diverse, they are subject to similar challenges, which include a changing economic structure, introduction and development of new industrial technology, changes in employers' expectations, changes in teaching and learning methods, and an increase in the number and diversity of students. The implications of these changes are examined in relation to providing for postcompulsory education and training, with a focus on planning, design, and management. Appendices provide discussions of the economic and demographic context, trends in postcompulsory education, and six case studies. One table is included. (15 references) (LMI)

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Decentralised Programme on
Educational Building

SME/PEB/90.9

GENERAL DISTRIBUTION

Paris, November 1990

Or. Engl.

EDUCATION AND TRAINING AFTER THE COMPULSORY YEARS:

BUILDINGS, EQUIPMENT AND LINKS WITH INDUSTRY

Report of a symposium held in Espoo, Finland

14 - 17 May 1990

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Pursuant to article 1 of the Convention signed in Paris on 14th December, 1960, and which came into force on 30th September, 1961, the Organisation for Economic Co-operation and Development (OECD) shall promote policies designed:

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- to contribute to sound economic expansion in Member as well as non-member countries in the process of economic development; and
- to contribute to the expansion of world trade on a multilateral, non-discriminatory basis in accordance with international obligations.

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The Programme on Educational Building (PEB) was established by the Council of the Organisation for Economic Co-operation and Development as from January 1972. Its present mandate expires at the end of 1991.

The main objectives of the Programme are:

— to facilitate the exchange of information and experience on aspects of educational building judged to be important by participating Member countries;
— to promote co-operation between such Member countries regarding the technical bases for improving the quality, speed and cost effectiveness of school construction.

The Programme functions within the Directorate for Social Affairs, Manpower and Education of the Organisation in accordance with the decisions of the Council of the Organisation, under the authority of the Secretary-General. It is directed by a Steering Committee of senior government officials, and financed by participating governments.

Publié en français sous le titre :

L'ENSEIGNEMENT ET LA FORMATION
APRES LA SCOLARITÉ OBLIGATOIRE:
LOCAUX, ÉQUIPEMENT ET LIENS
AVEC LES ENTREPRISES

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Education and training after the completion of compulsory schooling presents special problems for those responsible for planning and managing the provision of buildings and equipment. It is a large, diverse and complex sector in which a range of institutions, both private and public, have a role to play; by its transitional nature it is subject to the changing expectations of students, industry and society as a whole; and it has to adapt to a world of increasingly rapid technological change.

The present document attempts to clarify the implications of this complicated situation for the designers, planners, managers and users of institutions of education and training which cater for the 15 to 20 year-old age group and beyond, and to suggest strategies for providing effectively for this age-group. It is based substantially on the proceedings of a symposium jointly organised by the OECD Programme on Educational Building and the Ministry of Education, Finland, and held in May 1990. It also draws on work carried out elsewhere in the Organisation, particularly in the Directorate for Social Affairs, Manpower and Education.

The report has been prepared by Richard Yelland, of the Programme on Educational Building; the views he expresses are his own and do not necessarily represent those of the participants.

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INTRODUCTION

Post-compulsory education and training - that period of education which follows the years of compulsory school attendance and precedes entry into working life or continuation to higher education - is characterised by diversity and variety. This diversity has several dimensions. Although almost all OECD countries now have a system of compulsory schooling including primary and secondary phases, there is far less consistency in what follows. In some countries (for example Sweden) almost all young people pursue their studies in a single comprehensive institution; in others, for example France, there remains a separation between those who are following courses of general education with a view to University entrance and those who are intent on gaining vocational qualifications as a passport to employment. Some post-compulsory institutions have several thousand students, others have less than one hundred; some are highly specialised, others offer an almost limitless range of courses; some cater almost entirely for sixteen and seventeen year-olds, in others young and old study together. Despite the differences between these institutions, and the systems that they make up, all face a number of developments in the societies of which they are part. Among these changes are:

- a changing economic structure which has seen rapid growth in numbers employed in the service sector;
- the introduction of new industrial processes and methods which render much initial training obsolete;
- the rapid and continuing development of new technologies which has created new industries and transformed others;
- changes in the expectations of employers;
- changes in teaching and learning methods;
- expansion of the numbers of students and of the range of their backgrounds.

Annexes A and B contain a more detailed discussion of some of these developments. The ensuing chapters of this report look in turn at their implications for the planning, design and management of educational buildings.

PROVIDING FOR POST-COMPULSORY EDUCATION AND TRAINING

The implications for educational building of the changes which are taking place in the economic and educational world can only be fully appreciated in the particular circumstances of a specific institution or group of institutions. The following paragraphs attempt to draw out some common issues which emerged from the studies preceding the symposium and the discussion thereat. They are intended to provoke discussion and should not be taken as prescriptions to be applied in all, or even most, situations. For convenience they are grouped into three sections - planning issues, design issues, and management issues. Some of the issues raised in these three sections are the consequences of the unpredictable nature of change itself, and they stress the need for flexible response strategies; others arise from developments which have taken place, or are taking place, and lead to more specific recommendations. A few are of relevance only to certain categories of institution, although the majority will be of more general application. All were brought up in discussion at the symposium or in the papers presented to participants.

Planning Issues

Inventory of the existing building stock

The first requirement of a rational planning system for the provision of educational facilities is an accurate and up-to-date picture of the existing stock. This will usually be in the form of an inventory of sites, buildings and equipment. The most common mistake made by those setting up such a data-base is to include, or try to include, too much information. The vastly-increased processing power offered by today's computers does indeed open up the possibility of carrying out in a few minutes sophisticated analyses that previously would have taken weeks, but they do not yet offer equivalent short-cuts in data-gathering.

A data-base has more uses than just the planning of new facilities and in any administration there may be a number of people using the same basic information to perform different specialised tasks. For this reason it is recommended that a core of essential information should be identified, to which can be added the supplementary information needed in particular circumstances. The core might contain information about the location, size (or capacity), age, condition, current use and value of buildings.[1] The supplementary information that those responsible for planning post-compulsory education will need may include an assessment of the potential of existing buildings for conversion or adaptation: this would cover the possibilities for changing the use of individual rooms in existing post-compulsory institutions, as well as the scope for changing the use of buildings at present employed for other purposes. Ideally a facilities planner will have at his or her disposal not only information on buildings owned by the education authority, but also some idea of what buildings at present used by other public authorities might potentially be available and suitable. This sort of information can be difficult to obtain not so much for technical reasons as for administrative or 'political' ones. Much will depend on the administrative structure of the area concerned; local authorities with responsibility for several sectors of education, social services, and other community facilities will be better placed than single-responsibility education authorities.

Planning for change

Despite falling birth rates, new building, adaptation and modernisation of post-compulsory institutions will continue to be necessary in response to changing participation rates and changing demands. Educational building represents substantial capital investment, and it is essential to make sure that this money is not wasted. France is perhaps the most notable example of a country where demographic and policy concerns dictate a substantial investment in new facilities for the 16 - 20 year-old age group in the next few years, but where, in the longer term, student numbers may be expected to fall. The guiding principle has been called planning for change, but what does this mean in practice? It is one thing to be aware that the buildings being planned today are likely to be obsolete in educational terms well before they reach the end of their useful life; it is quite another to be able to take practical steps to avoid expensive mistakes. Since it is not possible to predict the future, planning for change means taking courses of action which leave open management options - without adversely affecting the quality or utility of facilities.

One valuable technique is to plan some buildings or parts of buildings with alternative non-educational use in mind, so that should demand fall the investment still has value. There are of course very many available examples of the re-use of surplus educational buildings for a wide range of purposes, but more often than not this re-use was not envisaged when the buildings were originally planned. The siting of buildings and their relationship to facilities such as public transport, commercial centres and housing, will all influence the possibility for re-use. Although there are steps which can be taken to provide adaptability in a fairly general way (see 'Design issues' below) it may be more fruitful to provide for a single specific alternative use. For example, some teaching and social spaces can be designed to be easily converted to residential use; workshops can become small industrial premises; classrooms can become offices. The small additional initial investment required may prove to have been unnecessary, but the potential savings if, for example, premature demolition is avoided can be very considerable.

Economic appraisal

At the planning stage, despite financial, procedural and political constraints, decision-makers will often have to choose amongst a range of options - to build a new college or extend an existing institution; to choose a spacious 'green field' site or a smaller but more centrally-located one; to lease accommodation during temporary periods of high demand, or to build sufficient permanent accommodation to cope with the peaks. Decisions such as these, as well as more detailed questions about the quality of construction, will be made more easily if some form of economic appraisal is used to inform those taking them. A number of techniques are available, of varying degrees of sophistication. The essential point is that they should be capable of comparing on a realistic basis the costs over time of a number of different proposed schemes. At the least an appraisal of options will take into account recurrent costs, including maintenance and heating costs, and it may well include matters such as cleaning costs and the availability of transport. Without some sort of economic appraisal there will be a prejudice in favour of the solution with the lowest initial capital cost.

Economic appraisal is not restricted to easily quantifiable factors, although true cost-benefit analyses which attempt to take account of a wide range of effects can be cumbersome and open to different interpretations. It is usually possible to start with a fairly broad assessment, and only to proceed to detail if it is necessary to compare closely. It should be emphasized that the analysis is an aid to decision making, and should not be seen as a substitute for it.

Assessment of space requirements

Some form of assessment of space requirements has to be made for every building, and it has often been the case that central authorities would prescribe norms related to the age of students, the courses that were to be offered and a number of other factors. The appropriate area for any proposed new building could be calculated from these norms without further reference to the actual circumstances. Although such norms are frequently now advisory rather than mandatory, there is still a temptation to apply them to a given situation without taking into account the specific needs of the

institution concerned and the intentions of the users. The widespread decentralisation of responsibility for educational building to local or regional level gives an opportunity to bring the users of the building into planning discussions at an early stage in order to be able to take account of their views. Such participation by users in the planning and briefing process does not have to be very formal, but it must be genuine. A pretence at consultation will mean time wasted and the likelihood of raising false expectations; a real dialogue should lead to a better solution and a feeling of involvement on the part of those who will be using the building. Naturally it requires commitment from all parties, but the effort will be repaid.

Resource allocation procedures

Methods and criteria for resource allocation always play a significant, if not entirely transparent, role in determining the behaviour of educational systems. This is particularly true where local authorities or individual institutions have devolved responsibility for decision making but are dependent on a central or regional authority for finance, which is frequently the case. Care has to be taken to ensure that the way in which money is allocated does not undermine policy decisions. Better, they should give positive incentives to carry out the desired policy. There is a particular danger that resource allocation criteria and procedures can discourage or prevent innovation, and they should be carefully examined to ensure that this does not happen.

Colleges and schools will be unlikely to go to the not inconsiderable inconvenience of optimising their use of space unless they are allowed to benefit from the savings that result. Again, unless an institution was free to retain the income generated from lettings, facilities might remain closed at weekends because to open them would involve additional heating and caretaking costs, despite the fact that potential users would be willing to pay a fee which would do more than cover these costs. It is not suggested that the institution should retain all the savings, or all the income, but it must have enough to create an incentive to undertake the desired action.

Joint provision with other agencies

One factor that in many countries distinguishes the planning of facilities for post-compulsory education from that for primary and lower-secondary education is the multiplicity of agencies involved in providing instruction at this level. The situation is different in every country, and there are often wide variations within countries. Generally speaking however, the responsibility for providing education and training, especially that which is a more or less direct preparation for employment, is shared between governments and the private sector. Thus in Finland a substantial number of vocational schools are privately owned, but the system of training is centrally controlled by the National Board of Vocational Education. In the United Kingdom industrial sponsors are helping to pay the capital costs of the new City Technology Colleges. Such collaborations are still rare however, and often present new problems of administration and management which have to be overcome. Nonetheless one or two successful examples might lead to a rapid proliferation of imitations.

This sharing reduces the burden on the public sector, but it can also create competition between institutions for students. The resultant education and training market is regulated in varying ways, but the important point here is that the planning of provision is made more complex than it might otherwise have been in the absence of a flourishing private sector. Where competition is not direct, and given the substantial capital cost of providing new facilities there is an argument for greater collaboration between the different agencies involved in the planning of new provision. The cost of specialist or sports facilities might be shared; businesses which run training centres primarily for their own purposes might be willing to sublet some of their accommodation at certain times; conversely industry might wish to lease public sector accommodation outside normal class hours; or to contribute towards the cost of a new laboratory in exchange for access to it at certain times. (The question of the provision of equipment is considered under 'Management issues' below.)

More generally it may be appropriate simply to carry out a certain part of tuition on industrial premises. It is commonplace for students to undergo a period of work experience during their secondary education, but it is less so for them to receive instruction from their own teachers at the

workplace. In the current extension of the vocational lines of Swedish upper-secondary education to three years, 60 per cent of the third year will be spent at the work place. The education authorities retain control over what is taught and pay an allowance to the host company. On a smaller scale, the use of industrial premises can be very worthwhile for specialised modules of work which require equipment which is only available there.

Design Issues

The design of a building will naturally be dependent on local circumstances and prevailing regulations, and notably on the range of courses and activities that the institution in question is intended to cater for. Nonetheless the following general points identified by participants at the symposium may be useful.

Briefing

There was general agreement that the process of preparing the brief for the design or adaptation of a building was one that should involve the users as far as possible. It is a recurring criticism of planners and architects that they do not take sufficient notice of teachers and educators during the briefing process, and it will never be possible to please everybody. Nonetheless examples of collaborative briefing do exist which have led to highly satisfactory outcomes and there is scope for this approach to become more widespread.[2]

Flexibility and adaptability

In a context of rapid change flexibility and adaptability in the design of educational buildings are clearly going to be important and these concepts have been acknowledged as such for some time, but there is considerable confusion as to what they really mean. They have been usefully defined as follows:

> ***Adaptability*** *- the quality of a building which facilitates adaptation; adaptation may require relocation, replacement, removal or addition of the constructional elements, the services, or the finishes of the building. It is essentially large magnitude/low frequency change.*
>
> ***Flexibility*** *- the quality of a building which permits variations in activities, timetabling, class size, and methods of work without the need for adaptation as defined. It is essentially low magnitude/high frequency change.*

A recent seminar identified the following key design implications of adaptability and flexibility:

- "the structure should be framed, kept simple and with regular spans (at least 6 metres between columns); unless land costs are prohibitive three should be the maximum number of floors; the load-bearing capacity throughout the building should be enough to meet the maximum requirements foreseen;
- the geometry of the building on the site should allow for 100% expansion horizontally; there should be a clear height of at least 3.5 metres to the underside of the structure;
- the core elements - e.g. lifts and staircases, ducts, toilets, plant room - should not be expected to change and should be designed to meet the standard required by all potential users. They should be positioned either in the centre or on the periphery of the building. Specialised support spaces should be similarly sited;

- the planning grid should be within the range 1.2 to 1.5 metres and consistent with the structure and window spacing;

- four to six categories of space type should be provided - say 20-30m^2; 60m^2; 90m^2 and specific large spaces;

- the service infrastructure should be on a grid consistent with that of the structure. The design should allow for a possible doubling of capacity. Major service routes should have access that does not disrupt educational activity."[3]

Generally, space should not be designed for the exclusive use of one discipline unless this is necessary, for example for safety reasons, or if it is clear that that exclusive use will be intensive and will continue for a considerable period of time. This is not to say that spaces intended for specific purposes should not be as up-to-date, and as close to the 'real thing' as possible; but rather that they should be built in such a way that, when the time comes, they can be converted to another use. It has to be recognised that some activities in vocational education (for example motor vehicle painting) do have very specific requirements, and where this is the case it is a management task to ensure optimal utilisation rates and to counter the claims of subject specialists who may argue for exclusive use of space when it is not necessary.

Teaching areas

There has traditionally been a sharp distinction between general and specialist teaching spaces. Recent trends show a movement away from the conventional classroom, which can be used to teach anything from literature to higher mathematics, towards a dedicated space which reflects the nature of the activities going on in it. Where office skills are being learned many students and teachers like the classroom to look like an office. This and similar developments could pull in the opposite direction to moves to secure adaptability and flexibility if they were mishandled. The answer is on the one hand to ensure that all rooms have adequate cabling, ventilation, and insulation to ensure that they can be used by very different groups, and on the other to ensure that so far as possible the 'customising' of rooms is done with movable furniture and reversible changes. Reference has been made above to the need for a range of rooms of different sizes which will allow for variation in the size of teaching groups.

Non-teaching areas

Social facilities, for students of all ages, as well as for staff, can be difficult to justify when resources are in short supply. However, the contribution they can make to the atmosphere of the institution, and the well-being of its occupants, and therefore to the effectiveness of the educational process, is impossible to quantify, but it would be unwise to ignore it. Suitable provision need not be expensive. For example, small areas where students can meet and talk informally can often be created out of corridors by a combination of screens, furniture and decoration. Cafeterias cost more to establish and maintain, but can generate income which will contribute to running costs, and several examples of this can be seen in Scandinavia.

Institutions which are, by choice or by force of circumstance, becoming more open to those other than full-time students, need to ensure that they present an attractive and welcoming face to visitors, who might be newcomers seeking information about courses, businessmen looking for training packages for their employees, or people taking short updating or continuing education courses. (This mission to provide for the education and training needs of a whole community, including the most disadvantaged, under one roof can be seen in some United Kingdom tertiary colleges.) A seemingly obvious requirement is to have a single, clearly-identifiable principal entry, through which visitors will find a reception and waiting area, preferably staffed and equipped with display panels and information about the institution. Clear sign-posting of rooms and of routes through the building becomes more important.

Institutions which seek to compete with the private sector in the provision of short updating courses for employed adults may find it necessary to invest in hotel-quality facilities if they are to attract business. Quite apart from the fact that decent facilities may improve the quality of the course, residential training is often seen as a perk by employees who expect to be well looked after. Poor facilities may only entrench negative perceptions of the lack of professionalism of the education system and undo excellent teaching work. A similar argument applies when providing for those who left compulsory education prematurely or as 'failures': second-chance education for these adults - non-residential as well as residential - must avoid causing students to repeat earlier bad experiences. Although many adult students are highly motivated, and are prepared to (and often have to) put up with second-rate accommodation, others will be discouraged by a return to a formal classroom setting. If this can be avoided, it should be.

Libraries and resource areas

As we have seen, the design of educational buildings is not only a matter of keeping open options in the face of unpredictable change; some of the trends which have been identified in post-compulsory education give clear indications of appropriate building responses. Central among these are changes which are taking place in the learning process. As students are encouraged to make use of a variety of resources in their learning and to pursue studies on their own at their own pace so their accommodation needs change. Libraries and resource areas take on greater importance; more and more they are becoming the focus of the building. As well as books and other information sources, they have to have sufficient space for students to work, sometimes for long periods. Study areas need to provide for small groups as well as for individuals; some will be silent, others will not be. Naturally libraries now need to combine printed resources with access to electronic data: this may raise security issues particularly if the library is open to the public.[4]

Links with industry

The implantation of commercial activities (for example banks or shops) in educational institutions and the development of education-based enterprise (for example running a catering school as a commercial restaurant; or selling the products of workshops) are two rather different ways in which to bring realistic experience of industrial or commercial life into the educational experience. Participants in the symposium felt that experiences of this kind were of considerable value, both educationally and practically, although they can lead to conflicts of interest which may not always be easy to settle.

Accommodation for teaching staff

Many teaching departments find it helpful to develop specialised resource areas with collections of material in their specific fields. Suitable spaces need to be provided. These resource areas are often physically close to staff work areas. As the teacher becomes a 'learning manager' there is a growing need for office-type accommodation for teaching staff, in addition to the traditional common room. Although in many institutions standards are improving, it is still a common sight to see teachers having to prepare work in cramped conditions which very few commercial organisations would tolerate. Schools and colleges are places of work as well as places of learning and such unsatisfactory facilities detract from teachers' abilities to do their jobs properly and contribute in no small measure to dissatisfaction and low morale.

Management Issues

Furniture and equipment

The wrong choice of furniture and equipment can be expensive and inimical to good education. This is a complicated area which cannot be dealt with adequately in this report.

Nonetheless it can be said that decisions about furniture and equipment should, if possible, not be taken in isolation from the design of facilities. Some activities require specific items of furniture, and where this is so there is no point in not providing them, but care has to be taken not to purchase items which will quickly become obsolete. The problem of providing up-to-date equipment in a wide range of fields is rapidly becoming impossible for educational authorities to solve on their own. For example, many managers quote four years as a realistic maximum period for which computers can be regarded as useful, and similar considerations apply to the latest machines used in many industries. In some cases leasing, or borrowing equipment may be economical; and in any case it is imperative to get maximum use out of such machines while they are still current. The problem is complicated by the fact that students now have to learn to operate a wide variety of machines and so a typical workshop may contain one each of a number of different types of machine, rather than twenty identical machines.

Industry is a valuable source of equipment for educational institutions. It can either be given, lent (at no cost) or leased (for an agreed price), and the appropriate course of action will often depend on the purpose to which it is to be put. Final-year students specialising in a particular field will usually need access to the very latest equipment which institutions are unlikely to be able to get hold of at no cost. (It is not unknown for companies that have lent equipment for teaching to borrow it back for manufacturing.) On the other hand those studying technology as part of a more general course will be able to learn even from obsolescent equipment. Some examples of arrangements which can be made between educational institutions and industry for the provision of equipment are given in Annexe C.

Space utilisation

It has always been necessary to make effective use of available space, but the diversity of new demands makes for even greater urgency. Although in some countries it has been, and indeed still is, the custom to allow each teaching group its own space, even at the upper secondary level, this can be wasteful of resources if that space is not put to alternative use when its regular users are elsewhere. The more time a group spends away from its home base (for example, if the home base is a general classroom, as more time is spent in laboratories, in the library, on physical education or elsewhere) the lower the utilisation factor will be. 'Model offices' and other spaces which seek to simulate working conditions should not become the exclusive preserve of a single class, or a small group of classes. A recent report recommends that: "All general teaching rooms should be subject to common timetabling and be pooled, for general use, rather than allocated to individual departments."[5]

As curricula become more diversified, these pressures will increase. The management task will be to make sure, by use of sophisticated space allocation and timetabling systems, that all rooms are as fully used as possible. It will also be necessary to achieve far better monitoring of actual use than is at present the norm: too many institutions have only the sketchiest idea of the degree to which individual spaces are utilised. There is a particular need to develop amongst the users of buildings a greater awareness of the potential and of the costs of the buildings which they occupy. Modern buildings are very sophisticated entities and it is far too frequently the case that the users, and even sometimes the managers, of a building are unaware of the features that have been built into it, or of how to make use of them. User behaviour has been shown to be a key element in energy conservation strategies[6] and it is equally relevant in space utilisation.

The modular organisation of courses offers the prospect of greater flexibility in arranging teaching groups so that they make good use of the space available. For example, a number of different jobs demand knowledge of welding techniques: if each study line is separately accommodated each requires its own welding booths, which in turn demand sophisticated air extraction systems for safety reasons. It would perhaps be more economical to provide one welding shop which could be used by every group which has a welding module in its course.

Finally, it is clearly important to make sure that laboratories and workshops are put to the use for which they were intended. In this context it is worth noting the widespread move towards creating small areas within workshops and laboratories for the teaching of theory to groups of 8-12 pupils on primarily vocational courses. This has the benefits of keeping theory and practice together, and of

allowing teachers and students flexibility in moving from one to the other, and it avoids the situation in which a small group blocks a large classroom. The practice should not be taken too far, however, or it will have the opposite, but equally unsatisfactory, effect of blocking workshops while theoretical work is being carried out.

Opening hours

Most measures of space utilisation are based on a forty-hour week and a thirty to thirty-six week year. There are however persuasive arguments, on property management grounds, for extending opening times so that establishments are open at least 12 hours a day, six days a week, and 48 weeks a year. Some institutions already do just this, but many others are in operation for only a part of the theoretical maximum[7]. It seems right that decisions about the hours for which an institution remains open should be made locally, in the light of local circumstances, provided statutory obligations are met.

Extended opening implies additional costs which can be considerable, and it is often not worthwhile to open a whole school for a small number of people. Such situations can sometimes be avoided by zoning, or sub-dividing, the building so that only that part of it which is required for use needs to be opened, heated, lit, and cleaned. Year-round school operation, which is in use in some parts of the United States, can be either a permanent arrangement, or a means of coping with a temporary peak in enrolments. Its introduction needs careful planning and consultation however and so it is not suitable for very short-term increases.

Networking

Where high-cost specialised facilities are concerned it may be necessary for institutions to enter into collaborative arrangements with each other, or with industry, in order firstly to enable the facilities to be provided, and secondly to ensure that full use is made of them once finished. Networking, or co-operation, is the reverse of competition. In a mature system it is likely that the two will co-exist. Different institutions will develop different specialisations, and although they may compete in some areas they are likely to respect each other's expertise in the specialised areas[8].

England provides an example of a very simple form of networking. In one urban area three tertiary colleges have been established: each provides a wide range of courses which differs only in that each has an area of specialisation - for one catering, for another hairdressing and beauty, for the third nursery nursing. Thus it has been possible to reduce the amount of specialist facilities that have to be constructed. This principle can be applied to very many other combinations of subjects, and to any number of schools or colleges, provided they are all easily accessible from each other.

A different network configuration is possible when expensive, specialist facilities are concentrated in one central institution, which acts as a focus for a number of satellites. A variant of this can be seen in Sweden where technology resource centres serve a number of upper secondary schools. Computer technology opens up the possibility of sharing specialist teaching resources between schools which are physically distant from each other. This approach is not restricted to theoretical work - pupils in a rural school in Australia which does not have a specialist music teacher can link up with a metropolitan school which does.

To be successful networking often requires a less proprietorial attitude on the part of a building's occupants to the facilities they are using. At its simplest it is a matter of formalized sharing, which can make possible the enrichment of the curriculum choice offered at the same time as offering a more effective use of resources. It has a particular potential in the post-compulsory sector where it is important to offer a very wide range of opportunities to all students, whether they live in the metropolis or in more sparsely populated areas.

Marketing

Amongst PEB countries it is in the United Kingdom that the emphasis on the marketing of post-compulsory institutions is most pronounced, but it is shared to a lesser degree in many others. There is a balance to be struck between planning - at national and local level - and independence. Within its defined role however an institution should so far as possible be free to make the best use of its facilities. A marketing strategy is a necessary tool in this task. Too often business and industry have turned to commercial providers for training which their local upper-secondary institution would have been able and willing to provide, simply because they did not realise that the possibility existed. Another option is the promotion of summer schools in order to fill slack periods in the year.

Marketing is not a gimmick. By establishing a clear image of what it offers an institution is helping its potential clients as well as itself. Nor does marketing necessarily imply internecine competition. Neighbouring institutions can work together in producing brochures or mounting exhibitions. Where there is a captive audience, these considerations may be of minor importance, but in the very many circumstances in which the student has a choice they are increasingly important.

Use of information technology

The rapid developments in information technology in recent years have opened up a number of possibilities for improving the management of educational buildings. Among the areas in which IT can be applied are

- computer-aided design (CAD);
- stock inventory and records (see also above);
- enrolment forecasting;
- energy management;
- environmental monitoring;
- timetabling and space allocation;
- security systems.

Personal computers lend themselves to the rapid simulation and testing of alternative scenarios, for example in catchment area planning, which once would have taken many hours of manual number-crunching. The use of information technology in the design and management of educational buildings was the subject of a recent experts' meeting organised by PEB.[9]

A property management approach

In sum, the discussions at the symposium underline the importance of adopting an active policy of property management in this as well as in other sectors of education. Few would dissent from the proposition that the scale of the investment tied up in buildings for post-compulsory education makes it essential that they should be used as effectively as possible, and the preceding paragraphs have given some suggestions about how this might be done.

SOME UNANSWERED QUESTIONS

While there was general acceptance of the need to co-operate more systematically with business, industry and commerce in the provision of facilities there was less unanimity about how far this process could go. Much of the discussion focussed on the problems of acquiring and maintaining appropriate equipment, particularly that associated with rapidly evolving technologies. Not everyone would be happy to enter into the sort of arrangements that are being made at Golden Grove (described in Annexe C) although there was agreement that something had to be done if schools and colleges were not to become museums of industrial and office equipment. It was apparent that many arrangements were made at local level, often on the strength of personal acquaintanceships. There were examples of very fruitful and mutually beneficial arrangements being made but there must be a certain anxiety about those institutions where such agreements have not been reached.

The whole question of relationships between individual institutions and the communities, especially local industries, which they serve (as opposed to the relationships between the education and training system as a whole and the social partners) is one aspect of the opening up of an education and training market. The different countries represented at the symposium recognise the validity of this concept in differing degrees, but it is clear that the tendency to decentralise responsibility for institutional management is increasing the competition - overt or disguised - between institutions. To the extent that this leads to greater efficiency in the use made of buildings and equipment it is to be welcomed, but there is concern that not all institutions are equally well-placed to take advantage of such a market, and that in a competition there are likely to be losers as well as winners. Maintaining equity in the education and training system is not primarily the responsibility of those architects, administrators and managers who were present at the symposium, but it was their concern that a lack of appropriate buildings and equipment in some areas should not add to existing inequalities of wealth within countries.

The symposium was unable to deal adequately with the various education and training needs of adults. There is even greater diversity in the ways in which these needs are met than there is in the immediate post-compulsory age group, and while there was some agreement that the provision of contract training for industry offered the prospect of additional income, this was still seen as a marginal activity. Policy-makers have only recently begun to attach to adult and continuing education the importance that they merit and, with some exceptions, the comparative neglect of these sectors is reflected in the facilities provided. It is inevitable, however, that as rates of technological, economic and social change continue to increase, and as people have both more leisure and longer lives, this balance will need to be addressed.

A final unanswered question concerns the parallel trends of decentralisation, referred to above, and internationalisation. Although no attempt was made to define where these trends might be leading it was emphasised that international co-operation and exchange of experience were likely to be of increasing importance, not so much between national Governments, but between regional and local authorities in different countries, and that mechanisms which encouraged such co-operation needed to be needed to be strengthened.

ANNEXE A: THE ECONOMIC AND DEMOGRAPHIC CONTEXT

The following paragraphs drawn from the background report prepared for the symposium summarise very briefly some recent developments in OECD economies and labour markets which have an impact on post-compulsory education. The picture is a complex one, which can only be sketched in the briefest of outlines in a document of this nature. References are given to the OECD work from which they are drawn, and to which the reader requiring more details is recommended to turn.

The labour market has changed considerably in recent years, that is, since many of our educational systems took their present shape and since much of their accommodation was built. The single development most relevant to education and training is probably the continued rise in all OECD countries in the proportion of total employment accounted for by the service sector. In 1986 it was 61 per cent while manufacturing industry accounted for 30 per cent and agriculture 9 per cent. By contrast, the figures for 1976, ten years earlier, were 54 per cent, 35 per cent, and 11 per cent respectively. Improved productivity in manufacturing industry is partly responsible for this overall decline in numbers which is due to reductions in the workforce of the older industries, such as textiles, leather goods and steel, and masks an increase in 'hi-tech' industries such as chemicals, plastics and components of the electrical machinery industry. Within the service sector there are two distinct areas of rapid employment growth - the business and financial sector on the one hand, and social and community services on the other.[10]

A second important feature of the changing composition of employment has been the growth of female employment. Between 1979 and 1985 the proportion of women in total employment increased in all OECD countries, though by differing amounts. By 1985 the overall share of women ranged from just under 30 per cent in Spain to 47 per cent in Sweden. Women have a high representation in most of the service industries, and a relatively low one in manufacturing industry. Social services notably, but also restaurants and hotels, financial services and, in most countries, business services employ a large number of women. With the exception of Norway, women tend to be slightly under-represented in public administration, and they are a very small proportion of employment in industries such as mining, construction, transportation, communication and storage.[11]

This paper does not discuss the factors underlying these structural changes in the labour market which include patterns of international trade, the role of multinational companies, the rapid growth of some less-developed countries and advances in technology. Suffice it to note firstly, that there is no sign that the pace of innovation is slowing, and secondly, that technological advances contribute to the changing industrial structure in a number of ways. They bring the possibility of productivity increases in traditional industries by substituting capital equipment for labour; they lead to the development of entirely new industries - for example computer manufacture, or the communications industry; and they have led to the transformation of the service industries. As a result unskilled and semi-skilled jobs are disappearing rapidly and there is a demand from employers for better-qualified, more adaptable personnel. Highly specific trade skills are giving way to more broadly-based technical skills.

Among other changes which have been observed in the labour market but where the impact has not yet been so great as in those described above are the changing balance between the numbers of full-time and of part-time jobs; and the growth of temporary employment. If they continue, they are likely also to have significant impacts on post-compulsory education.

The result of all this is that the notion of education and training as something which is completed as a preliminary to a lifetime of work in a single occupation is now applicable to a rapidly decreasing minority of people in OECD countries. It has been claimed for example that the average 23 year-old in the United States will change jobs seven times in his or her working life. Even those who stay with the same employer will find that the job they have to do changes around them. The newspaper printing industry illustrates how what is ostensibly the same product as it was ten years ago can utilise quite different skills in its production.

The ease with which people can obtain, or change, jobs is also influenced by unemployment rates. It is hardly necessary to remind ourselves that overall unemployment has increased in every OECD country since 1979, although there have been improvements in a majority of countries since

1984. Youth unemployment, in those countries for which comparative data are available, is generally higher than overall unemployment. However there are substantial variations between countries in both the overall unemployment rate and the youth unemployment rate. Training schemes and demographic trends have combined to reduce youth unemployment in recent years and it is clear that the number of young people coming onto the labour market will decline rapidly in almost all countries in the next ten years.

In the fifteen years from 1971 to 1986 the total population of OECD countries grew from 723 million to 814 million, an increase of almost 13 per cent. At the same time the total labour force grew even more rapidly, from just under 43 per cent of the total population to more than 46 per cent. Growth in the total labour force is expected to continue in the period to 1995, but rather more slowly. The main reason for this is the slowdown in the growth of the working age population, and in particular the reduction in the 15-24 year-old age group as the 'baby-boom' cohort ages and the lower fertility rates of the late 1960s take effect. Table 1 shows that the number of births in countries participating in PEB declined gradually from 1966 to 1986 and that the 16 year-old age group will be about 20 per cent smaller in 2002 than it was in 1982. It is likely therefore that the post-compulsory education and training sector will see a reduction in the size of its main target group at the same time as an improvement in its prospects of employment. Indeed in some countries a shortage of labour is foreseen which may well put pressure on the education and training system to release young people on to the labour market more rapidly, and at the same time increase the demand for short retraining and updating courses for those in employment.

Table 1: Births in PEB countries 1966-86

('000S)

	1966	1971	1976	1981	1986
Australia	224	276	228	236	243
Austria	129	109	87	94	87
Belgium	151	139	120	125	117
Denmark	88	76	65	53	55
Finland	78	61	67	63	61
France	860	881	720	806	779
Greece	155	141	147	140	113
Ireland	62	68	68	72	61
Netherlands	240	227	177	179	185
New Zealand	60	64	55	51	53
Norway	67	66	53	51	52
Portugal	207	181	187	154	127
Spain	662	665	677	532	451 (1985)
Sweden	123	115	99	94	102
Switzerland	110	96	74	74	76
Turkey	n/a	n/a	n/a	1482	1531
United Kingdom	980	902	676	731	755
PEB total (excluding Turkey)	4196	4067	3500	3455	3317

Source: *Labour force statistics 1966-1986*, OECD Paris 1988

Irrespective of whether or when the youth unemployment problem is going to disappear, we have entered an era in which working life begins later than, and is different in nature, from what is has been hitherto. For most, perhaps, it will be significantly shorter than the fifty years from 15 to 65, although significant numbers, particularly those who are self-employed, will wish to continue well beyond statutory retirement age. The proponents of recurrent education have long predicted the

coming of the time when education is seen as lifelong and continuing. We may not yet have reached that point, but it is clear that the demand for continuing education of all types is growing. And this is happening when the reduction in the size of the 16-19 age-group is encouraging institutions to look outside their traditional clientèle for prospective students.

ANNEXE B: TRENDS IN POST-COMPULSORY EDUCATION

The following paragraphs drawn from the background report prepared for the symposium do not attempt to provide a thoroughgoing analysis of the state of post-compulsory education in OECD countries, but simply to draw attention to key developments which have been identified and which have implications for educational buildings and their use. Much of this material has been drawn from the General Report and associated country studies on the 'Organisation and content of studies at the post-compulsory level' prepared for the OECD Education Committee [12] and to which readers seeking further analysis are directed.

Conventionally policy analysts in the past have spoken of three streams of post-compulsory education - general, technical and vocational - although the extent to which individual education systems have reflected this distinction, which has its origins in the labour market, has always varied. As greater fluidity becomes apparent in the content and organisation of work, traditional demarcations are beginning to be broken down. The 'general' educational content of vocational courses is seen as increasingly important, not only in giving a broad and solid base to the student's knowledge, but also for his personal development and growth. The post-compulsory educational world has also in the past been divided into those courses which lead to University and those which do not. This distinction still has a very real meaning, for institutions and individuals, but it too is being weakened by the establishment of bridging courses and the waiving of formal entrance requirements for certain groups of students. In each OECD country the actual structure of provision combines elements of both these distinctions but the general trend is towards institutions which combine different types of provision and to educational systems which increasingly open up the possibility of transfer between different streams and courses.

Thus, although many small, specialised institutions remain, the trend is away from them to larger, more comprehensive institutions. In both Finland and Sweden the numbers of possible study lines have been drastically reduced. Sweden however places all 16-18 year-olds into one integrated institution, whereas in Finland the institutions retain their subject specialisms, but are more vertically integrated (i.e. they cover low and high level work). The traditional apprenticeship system has lost ground in a number of countries where many students are preferring, where it is on offer, a broader vocational education which allows them to keep open for longer their career options. In the United Kingdom apprenticeship has more or less been replaced by the Youth Training Scheme (YTS) which offers to all 16 year-old school leavers who do not have a place in full-time education, or employment, a two-year period combining work experience and off-the-job training. In Austria and Germany however the long-established dual system in which trainees have one day a week of compulsory vocational school continues to attract a significant proportion of the age-group.

The extent to which adults are integrated into the same institutions as 16-18 year-olds varies. In Austria the employers' and employees' organisations run retraining and updating schools for their members which are separate from the vocational schools for young people. In the United Kingdom further education colleges are the main providers of vocational courses for adults. Non-vocational adult education, although usually organised separately from the rest of post-compulsory education, is very often accommodated, at least in part, in school buildings, particularly in the evenings.

There is considerable innovation in modes of study. Those in employment have traditionally extended their education at night-school or by correspondence, but the range of options open now includes workshops, 'drop-in' centres where individual help is available to those who need it, tutored video instruction (TVI), computerised individual learning programmes[13] and courses which combine different modes of study according to the student's preferences. The number of students studying part-time has, for example, been growing steadily in the United Kingdom. Nonetheless the extent to which individual institutions offer a variety of modes of study differs enormously, and it remains generally true that the predominant mode of study, at least for 16-20 year-olds, is still full-time, and that study is carried out during the conventional academic year.

In all countries the nature of post-compulsory institutions is determined by a mixture of national and local factors: in some systems the former are predominant, in others the latter. Curricula and qualifications are usually nationally defined; and teaching staff are often paid, and sometimes

appointed, by the national government. Buildings and their management are increasingly the responsibility of local authorities, and, for the larger institutions if not for all, this responsibility is frequently delegated to the institution. Additional building, and/or renovation work, which requires capital expenditure, usually has still to be approved by higher, often national, authorities. The responsibilities of the various authorities and their inter-relationships are highly complex and are the subject of a separate study being carried out by PEB in 1990. One of the most difficult areas for managers of institutions can be the replacement of equipment. Computers and computer-driven machines are evolving very rapidly and quickly become obsolescent. If allocated budgets are insufficient many institutions seek the help of local industry with loans, or gifts of equipment. The influence of local employers and of the community is strongest on the day-to-day working of institutions. They are often represented on management committees as well as in less formal ways and help to shape the character of a school or college.

Both public and private providers can be found throughout the post-compulsory sector. Generally speaking the primary responsibility for general education after compulsory schooling is assumed by the state; whereas there is broad agreement that the private sector has the primary responsibility in the provision of updating and on-the-job training of adults. Between these two poles, however, the situation is far from clear-cut, for reasons which need not concern us. What is important, for planners and designers of buildings, is the apparent convergence between the content of 'general' and 'vocational' programmes, whether they are provided in the public or private sectors, or jointly.

In the longer term we may also expect to see the consequences of European and international integration on post-compulsory education, for example an increase in exchanges of both students and teachers and the development of courses which operate in more than one country. The implications of such developments for buildings may be limited at first, but will become more far-reaching as time goes on. The resulting pressure will be towards convergence of provision and practice.

Although OECD countries vary widely in their post-compulsory education and training systems, it is possible to make a number of simplified statements about post-compulsory education which have implications for building policy, as follows.

Post-compulsory education and training are concerned with *students who are beyond the age of compulsion.* That may be obvious, but it has some less than obvious conclusions for policy-makers. It means that if education systems do not provide what is required, the customers - be they the students themselves, or their prospective or actual employers- may look elsewhere. To the extent that the post-compulsory sector takes on the characteristics of a market, it is less easy to plan a certain number of places for a given number of students following a set curriculum. It is not that planning becomes impossible, but it certainly becomes more difficult and it has to be done in a more flexible and responsive way. Co-operation with the labour market, which has traditionally been strong in this sector, becomes increasingly important. Moreover, colleges and schools will increasingly find themselves in competition for students, and will diversify their 'product range' in order to attract new business. Evidence of this can be seen in the United Kingdom, for example.

In OECD countries post-compulsory education is more or less rapidly becoming *universal.* Although the percentage of the age-group which remains in some form of education or training, not necessarily full-time, for one or more years after the age of 16 varies quite considerably, it is rising in most countries. Enrolment rates for the 15-19 year-old age-group are over 75 per cent in Germany and Switzerland, owing mainly to the extent of part-time education, as well as in Belgium and the United States; in most other countries the rate is over 60 per cent, although in Australia, New Zealand, the United Kingdom, Greece and Turkey it is lower[14]. The percentage of pupils staying on in education in the first year after the completion of compulsory schooling is close to 100 per cent in a number of countries (for example Finland and Sweden.) There are several reasons for this:

a) the scope and complexity of the school curriculum is growing, and the requirements for entry to employment are becoming more wide-ranging. Increasingly employers are looking for well-educated, adaptable employees rather than individuals trained in narrow specialisms;

b) chronically high levels of youth unemployment in a number of countries have closed the door to the possibility of finding a job at 16, and many young people are continuing their education when they would perhaps not otherwise have done so;

c) it has been the overt policy of Governments to encourage a greater percentage of young people to stay on in education and training.

Post-compulsory education and training is taking on a *continuing and episodic nature*. This reflects the growing demand for educational opportunities which are open to adults of all ages, referred to above. As a result the first stage is seen as a foundation, be it for further study or for employment, and has a transitional function, combining general and specific knowledge. However, if post-compulsory education is *continuing* it is not *continuous*. For more and more people education, or training, is something to which they return from time to time, in order to add to, update, or deepen their knowledge, understanding and skills. This in turn has implications for the length and structure of courses, as well as for certification systems (see below).

Post-compulsory education is full of *diversity*. Curriculum content covers different levels and a broad spectrum of occupations; study can be carried out in several modes of attendance - full-time, part-time, short course, evening classes, open learning - or in a mixture of these; and there is a variety of modes of delivery - conventional classrooms and workshops are giving way to distance learning, instruction through video, and computer-assisted learning. The students themselves are not restricted to particular age- or social groups. There is diversity too in the type and size of institution in which people learn, in the sorts of qualification towards which they are working and in the expectations and needs which they have. The desire of institutions for survival is combined with a mission to open up educational opportunities to all, especially those who have not taken such opportunities in the past or who face difficulties of access to conventional courses, for example members of ethnic minorities, the elderly, women with young children, and the handicapped. The result is the creation of a range of new courses which offer variety of modes of study as well as of content.

Finally there is a growing interest in *credit transfer* and the creation of bridges between sectors. Where there is convergence between types of post-compulsory education which were formerly separate; where more people are staying on at school to learn more things; and where adults are returning to education at intervals during their lives; there is a need for a system of certification or validation which is both universal and universally understood. Both students and employers need to know what a particular course contains, and to be able to compare it with others. This implies cross-crediting or transferability of qualifications. There is already in some systems a move away from 2- or 3-year courses culminating in an all-or-nothing examination towards one in which credit is gained continuously throughout. For example, students in Scotland now have in principle the possibility of constructing their own courses out of a range of hundreds of different modules.

It would be unhelpful to speculate at further length on the directions which post-compulsory education and training will take in the future. There is, however one implication of what has been said above which needs to be drawn out. The characteristics identified are not those of a sector which is simply an extension of compulsory schooling. The picture is rather one in which the student and his or her needs are at the centre. They will be met by a range of institutions, public and private, full-time and part-time, combining employment and education. The student who wishes to study, say, mathematics, Japanese and horticulture should be able to do so, at his own pace, and perhaps at more than one institution. And on completion of these courses he will want to be able to take with him a portfolio which records what he has done and the standards he has achieved, and which he can show to a prospective employer, or to any educational institution which he might wish to attend in the future. The details of such a system are not the stuff of this paper, but an understanding of the general tendencies is important in planning and designing the buildings in which post-compulsory education will be housed.

ANNEXE C: CASE-STUDY MATERIAL

Six case-studies were presented at the symposium. Each describes some aspect of the provision of post-compulsory education as it actually exists; taken together they illustrate some of the problems faced by post-compulsory education institutions and some of the solutions which are available. The six case-studies are summarised below: copies of the presentations made at the symposium are available from the PEB Secretariat, OECD, 2 rue André-Pascal, 75775 PARIS Cedex 16, France.

I. Golden Grove, Australia

Golden Grove is a developing suburb of Adelaide in South Australia which will eventually house some 30 000 people. The educational and other human service facilities could therefore be planned from the beginning to take account of new emphases in educational policy.[15] The case-study describes the new facilities for post-compulsory education and training - Tea Tree Gully College of Technical and Further Education and the Golden Grove Secondary Education Complex - and outlines the considerations which have influenced their planning and design. Four issues which have had a particular impact on the design of facilities are identified, and because of their potential relevance to other OECD countries they are reproduced at some length.

Rapid growth in student numbers in the post-compulsory sector

There is no doubt that the numbers of students seeking post-compulsory education are rapidly increasing. Teenagers are being encouraged to stay at school longer (there is a growing belief in Australia that the school-leaving age should be raised from 15 years to 16), other teenagers who have already left school are being encouraged to return to an educational institution to obtain better qualifications, adults are being similarly directed in order to have the skills necessary to be gainfully employed, and adults who have been absent from the workforce for some time are finding it necessary to be re-educated in order to re-enter the workforce.

In addition, community leaders and educators are slowly but surely convincing the population that education is a lifelong process and the stigma associated with re-entering educational institutions as an adult is diminishing.

This rapid increase in the numbers of older teenagers and adults wishing to be educated has necessitated a number of changes in the style of educational facilities and the amenities which are provided therein. These include:

- the provision of comforts which adults expect to be present in all of the environments in which they operate;
- the development of buildings which are inviting and suitable for adults;
- the provision of facilities for students not "in class".

In both the Further Education College and the Secondary School Complex at Golden Grove the facilities and features proposed to cater for these aspects include:

- adequate car-parking;
- proximity to public transport;
- access to on-site or adjacent child-care facilities;
- a modern, inviting, cafeteria which will offer a variety of cuisines;

- modern recreational facilities including a stadium, gymnasium, and health and fitness centre;

- adjacent shopping facilities

Demands for new enterprise skills

Employers and community leaders have communicated a number of clear messages to educators regarding their requirements for post-compulsory education through the release of a number of recent publications calling for the raising of the skill levels of the Australian workforce and the adoption of more effective and cost-efficient ways of achieving this end.

This group has also argued that in order for graduates to acquire higher levels of relevant, broad-based and transferable skills, educational institutions will not only have to redirect their efforts towards those areas in which skill shortages have been identified but will in addition have to pay more attention to the learning processes being applied. That is, if they are to produce graduates who are more self directed, able to identify and to solve problems, make decisions and adapt to changing conditions then they will need to apply methodologies which are student rather than teacher centred.

For those who reside in the Golden Grove area this has been accommodated in two distinctly different ways. The Secondary School complex, through its sharing arrangements and close association with a private developer is endeavouring to provide for the post-compulsory sector through enhanced curriculum diversity and choice, increased emphasis on subjects which deal with technology and its application, on the ability of its facilities to be modified efficiently in order to adapt to changing needs and the creation of partnerships with business, industry and commerce.

The Further Education College for its part is concentrating on learning methodologies which are student-centred and rely heavily on advanced technology. The educational planners for this new college believe that the new learning strategies adopted will not only provide an increase in educational effectiveness but also result in productivity gains and cost savings compared with more traditional colleges.

The adoption of a student-centred learning approach depends heavily on the availability of materials for self-directed learning. Regardless of the form or combination of forms the materials may take (e.g. printed, interactive computer, film or interactive video) they are almost invariably the product of advanced computer technology and rely on advanced technology for their delivery. In fact it is the advent of increasingly user-friendly and affordable technology which is making the development of such material, and hence the universal application of the methodology, possible. Once produced self-directed learning materials lend themselves for use in a number of ways, both on- and off-campus.

Students on the Golden Grove campus have the opportunity to share courses and facilities in four ways:

- students may utilise the shared facilities as a member of a class from one of the schools which has programmed use of a particular facility;

- where insufficient numbers exist in one of the schools to justify the teaching of a certain subject, students from the three schools may combine to create a viable class and be taught by a teacher from one of the schools in the shared facilities;

- integrated timetabling for subjects such as languages allows students to participate in a subject even if that subject is not taught in their school;

- students will also be able to participate in the courses being offered by the Further Education College via a communications system which will provide access to learning materials. This removes the need for students to travel off-campus in order to participate, saving both time and transport costs.

The ability of the facilities at the Secondary Education Complex to be changed quickly in response to new needs has also now been demonstrated. Four of the classroom areas in the shared facilities were converted into two science, one woodwork and one computer studies room during the school holiday period. The multi-serviced walls and the use of mobile serviced cabinets were sufficient to ensure that this work could be undertaken within a period of three weeks without disrupting lessons. In the past, conversions of specialist areas have taken between three and six months and led to significant disruption to educational programmes.

Flexible timetabling

Part-time students and employers frequently have periods during which students are not available for classes. Educational institutions must be flexible in their approach in order to provide the educational opportunities being sought. Once again the processes adopted at Golden Grove have responded to this requirement.

The student-centred approach of the Further Education College has by implication the flexibility to accommodate the time constraints associated with each individual student. Furthermore, the learning materials are designed for off-campus use provided the place in which the student works or lives has the technology to cope with the software. This also implies that the College will not be required to have as wide a range of educational aids and specialist equipment (which is frequently expensive to provide, needs regular upgrading and occupies large volumes of space) as these will be present in the work or home environment of the student. Moreover, teachers will become significantly more mobile, travelling from venue to venue to ensure that the individual student's supervisory needs are catered for.

The question which remains unanswered in this approach is the extent of the disadvantages associated with the fact that students are not able to interact regularly in the classroom.

The Secondary School Complex has been planned so that each faculty can operate independently and if necessary during different hours of the day. Thus the computer laboratory, for example, can operate for extended periods outside regular school hours without jeopardising the security of adjacent facilities which are shut down. In addition the complex can be used as a "summer school" during holiday periods.

New partnerships with business, industry and commerce

The necessity for educational institutions to establish closer links with industry and commerce has been internationally recognised. Historically in Australia, employer organisations have criticised educational institutions for not providing the skills and training which are regarded as appropriate for future employees. Similarly, schools have criticised employer organisations for not informing them about their needs. At Golden Grove, through the assistance provided by the private developer, six partnerships have now been established between the schools and industry, commerce and the community. These partnerships are:

- a ten-year agreement has been signed between the schools and an electrical hand-tool company for the supply and maintenance of tools in the technology area. The company has agreed to supply the schools with all electrical hand-tools at significantly discounted prices, maintain them free of charge and supply free examples of all new models. In return the schools have agreed that they will exclusively use this company's products, provide commentary on the effectiveness of new models, display promotional materials mentioning the company's involvement and hold public exhibition days for the company on a regular basis;

- an eight-year agreement for the supply of computer hardware and software has been signed between schools and a supplier. The benefits to the schools include significant reductions in the purchase price of computer hardware and software, the opportunity to

use state-of-the-art equipment at reduced rates, the development of software for curriculum and administrative purposes, significant staff training and development programmes (free of charge) and reductions in maintenance costs. In return the companies involved will receive publicity for their involvement in the campus, be able to use the schools as a testing ground for new products and will have guaranteed orders as the schools grow in size;

- an agreement has been signed for the provision of a communications network which will provide the medium for voice and data transfer around the campus and to key locations (in particular the Further Education College) off-campus. This equipment, which is new, has been purchased at approximately half price on the understanding that the schools will be used by the company for trials and for promotional purposes;

- the schools have reached an agreement with an organisation which trains intellectually and physically disabled people. This organisation intends to operate a horticultural nursery and retail centre which will form part of the secondary education campus. The schools will provide a classroom in the complex in exchange for use of the horticultural nursery as a learning resource for students wishing to take up employment in horticulture;

- the schools are negotiating with the Local Authority and a group of residents to establish an urban farm at Golden Grove which will be used by both school students in studies of horticulture and agriculture, and by the community as a recreation area and for growing flowers and vegetables for domestic use;

- the schools are finalising an agreement to construct a recreation and performing arts facility which will be shared with the community. Schools will have almost exclusive use of this facility during school hours, and the community almost exclusive use outside school hours.

The Further Education College is moving towards the introduction of a cooperative approach to education and training. As an example, it is currently negotiating with a number of hairdressing salons with a view to moving as much training off-campus as possible. To do this the College will provide the salons concerned with a log book listing the skills and knowledge which apprentices must achieve, and describing the standards to be reached; it will also provide learning materials. Salon staff involved in this venture will have the opportunity to undertake an intensive three-week preparatory course. Some education will continue to take place within the college's own teaching salons.

This approach will mean that teaching staff will play a different role. They will move out to industry to provide support and to ensure standards are maintained. The result will be a greater involvement of industry in the development of the curriculum and a lessening of the burden on the public education authorities for the establishment and maintenance of expensive teaching facilities.

II. Technikum Vorarlberg, Austria

The "Technikum" is an example of the way in which new institutional arrangements can be made to respond to emerging demands. It offers both a broader curriculum than the traditional technical school, and it draws its students from a wider base.

Although education in Austria is compulsory until the age of 15 years, it is at 14 years that the choice of post-compulsory institution is effectively made. Intermediate vocational schools *(Berufsbildende mittlere Schulen - BMS)* offer one-, two- three- or four-year courses leading to occupational qualifications. The higher vocational schools *(Berufsbildende höhere Schulen - BHS)* offer five-year courses, successful completion of which carries qualification for University entrance *(matura)* as well as occupational qualifications. The academic secondary schools *(Allgemeinbildende höhere Schulen - AHS)*, of which there are several types, offer an eight-year course (which pupils will have started at age 10) leading to the *matura* and thence to University.

The course offered by the "Technikum" is intended to prepare highly-qualified manpower for industry and is based on electrical technology, but includes practical work, management training, and foreign languagestakes. Students can enter the "Technikum" from BMS, BHS and AHS and they will be provided with a course of study which takes account of their different experiences at entry. The "Technikum" is a private school run by an association which includes the Federal Ministry of Education, Arts and Sports, the Provincial Government and the organisations representing both employers and trade unions. The Federal Government provides buildings and standard equipment and pays the teaching staff; the Province of Vorarlberg provides additional teaching aids, laboratory equipment and workshop equipment; and the other members of the association can provide complementary teachers and lecturers, scholarships for students and establish connections with industry.

The Technikum opened its doors in September 1989 with 90 students on three different courses. The students are instructed by a total of 20 teachers: three from industry, sixteen shared with higher technical schools and one (a language teacher) shared with an academic secondary school.

III. The "Escuelas Taller", Spain

This case-study differs from the others presented in one important way: it concerns a programme for which the primary responsibility comes from a Ministry of Labour rather than a Ministry of Education. The dividing line between "education" and "training" is becoming more and more difficult to draw and the demarcation of responsibilities between ministries, which is at best artificial, is a subject of considerable debate in many countries. In at least one, Australia, a new department has been created with responsibility for the whole of education and training.

The 'Escuelas Taller' or "workshop schools" are included here because they illustrate in a particularly interesting way the point that it is not always necessary to build new facilities in order to meet a training need. The 'Escuelas Taller' meet two principal needs. They provide vocational training for unemployed young people and they contribute to the rehabilitation of the architectural heritage, both directly through the work that is carried out on the buildings concerned, and indirectly through training people in a range of skills necessary to maintain and repair buildings and grounds using traditional techniques. Techniques such as stone-masonry, smithing, carpentry, glasswork, landscape-gardening are taught on sites which are in need of attention. Some temporary teaching and ancillary accommodation may be necessary but the use of existing buildings removes the need for purpose-built workshops and practice areas.

Although other countries may not have the exceptionally rich heritage of historic buildings that Spain has, and so might not be able to mount a programme on such a large scale (so far some 700 'Escuelas Taller' are in operation and 50 000 young people have been trained) the example of a programme which requires very little capital investment is one which may suggest some ideas for alternative approaches to at least some post-compulsory training needs.

Iv. Electrum, Sweden

'Electrum' is a building complex comprising offices, a conference centre, educational and research institutions, shops and services. It is the product of co-operation between the Swedish Government, the City of Stockholm, business and industry and its essential purpose is to provide qualified personnel in the data and electronics sectors. It is located in an industrial park near Stockholm where a large number of companies in the electronics business have their premises. One of the tenants at 'Electrum' is the Stockholm Schools authority which offers computer and telecommunications courses at upper secondary, and technical college level as well as contractual training for industry.

'Electrum' offers Stockholm Schools the possibility to install and to experiment with high technology equipment, and a policy of investment in high-levels of equipment, both in qualitative and quantitative terms has been adopted. In educational terms the mixing of students with a common interest in computer science but from different levels of education is proving to be highly stimulating.

v. Wearside College, United Kingdom

This case-study shows how a college in North-East England set out to meet the changing demands made by local industry for skilled personnel, and examines some of the effects on the College's programmes and its use of space and equipment.

Wearside College has recently been designated as one of two tertiary colleges in the Borough of Sunderland. A 'tertiary college' is an institution which caters for the full range of post-16 education and training in a given area; Wearside College has always had a strong vocational focus, reflecting the highly-industrialised nature of the area it serves.

Following the decline of traditional industries (mining, shipbuilding and heavy engineering) service industries have come to predominate in the area, although the manufacturing sector is still strong and the recent arrival of a major Japanese car manufacturer has had a significant impact. Changing working practices have led to a demand for personnel who are capable of dealing with systems that combine mechanical, electrical, electronic and software technology. This has led to the creation of a new Multi-Skilled Technician Training Programme in conjunction with a consortium of local companies.

The programme that has been developed combines practical and theoretical studies at the college with periods of industrial training in industry. It has been designed to allow flexibility of entry and exit and to allow progression to higher education. It has necessitated a radical re-appraisal of the college's approach and the development of specialist work areas, by converting existing workshops and laboratories. The case-study explains in detail how this was done.

The close involvement with a consortium of industries has led the college to examine its own space utilisation and to undertake a certain amount of teaching and assessment on employers' premises. It is felt that such use of employers' premises will increase in the future and that colleges should think very carefully about expenditure on alterations to their buildings and the acquisition of equipment before embarking on it.

vi. Dundee Institute of Technology, United Kingdom

This case-study describes the benefits of co-operation between a small engineering company (Rautomead) and Dundee Institute of Technology, which has some 2200 students on a variety of higher education courses in engineering and construction, management, and science.

In engineering education the cost of the equipment necessary to run courses at this level is a major and growing source of difficulty for many institutions. For small, specialist manufacturing companies it is very difficult to carry out the research and development necessary to support innovation. Rautomead and the Mechanical Engineering Department of the Institute have gone some way towards solving these two problems through the collaborative arrangements that they have developed since 1981. These arrangements are described in some detail in the case-study, which stresses the importance of making formal agreements based on mutual understanding and trust. It concludes that the partnership has:

i. benefitted the staff and students . . . by giving them direct access to plant of a commercial nature, which allows the study of complete manufacturing routes from the supply of raw materials to finished components;

ii. improved the integration within and across a number of subject areas taught on the courses, particularly those areas concerned with materials, manufacturing processes, design and economics;

iii. increased the emphasis on application of engineering principles throughout the courses in the Department of Mechanical Engineering;

iv. provided periods of supervised work experience in industry for students;

v. benefitted the company by creating closer links with academic staff working on a programme of research and development relevant to the company's needs;

vi. benefitted the Institute in that a supply of materials and equipment has been available to offset the lack of funding to educational establishments;

vii. given the staff, both academic and technical, the opportunity for personal development through visits and secondments to industry both in Britain and overseas;

viii. increased the usage of equipment already available in the Institute;

ix. supplied equipment to the Institute which could not have been obtained through normal budgets.

DOCUMENTS PRESENTED AT THE SYMPOSIUM

i. The Background Report by the Rapporteur (available in English and French)

SME/PEB/90.2	Education and training after the post-compulsory years: buildings, equipment and links with industry

ii. The Case-studies (available in English and French)

SME/PEB/90.3	Australia: Golden Grove
SME/PEB/90.4	Austria: Technikum Vorarlberg
SME/PEB/90.5	Spain: Escuelas Taller
SME/PEB/90.6	Sweden: Electrum
SME/PEB/90.7	United Kingdom (England): Wearside College
SME/PEB/90.8	United Kingdom (Scotland): Dundee Institute of Technology

iii. Other documents presented by participants (in English unless otherwise stated)

FINLAND	Introduction to Finland and the Finnish educational system (Ministry of Education)
	Vocational training in Finland (National Board of Vocational Education)
FRANCE	Les centres permanents de formation des adultes (Ministère de l'Education nationale) (in French)
GERMANY	The dual system of vocational education in the Federal Republic of Germany - principles and experience (Bundesminister für Bildung und Wissenschaft) (parallel text in German, English and French)
	Vocational training in the Federal Republic of Germany (Senatsverwaltung für Schule, Berufsbildung und Sport, Berlin) (parallel text in German, English, French, Portuguese and Spanish)
	Setting up, co-ordination and revision of syllabus, curriculum and examination standards in vocational training (Bundesinstitut für Berufsbildung)
	Research and development for vocational training (Bundesinstitut für Berufsbildung)
GREECE	Main features of the Greek educational system (Ministry of National Education and Religions)
	The Integrated Lykeion (Ministry of National Education and Religions Information Bulletin)
NETHERLANDS	Accomodation planning on the school level for large-scale vocational schools (Information Centre for Schoolbuilding)
SPAIN	Situation of the post-compulsory years in the Spanish educational system (Ministry of Education and Science)
TURKEY	The organisation of post-compulsory education in Turkey
UNITED KINGDOM	Britain: Post-school education; students; education-industry links

FURTHER READING

In addition to the documents referred to in the main text and those listed above, the following OECD publications and documents may be of interest.

i. Priced publications (available from OECD Sales Agents)

Education and training after basic schooling (1985) ISBN 92-64-12742-9

Education and the economy in a changing society (1989) ISBN 92-64-13176-0

Pathways for learning: education and training from 16 to 19 (1989) ISBN 92-64-23175-7

Labour market policies for the 1990s (1990) ISBN 92-64-13363-1

ii. Documents for General Distribution (free of charge subject to availability from Publications Division, OECD, 2 rue André-Pascal, 75775 PARIS Cedex 16, France)

Further education and training of the labour force: a series of country reports on policies, practices and institutional arrangements for the provision of, and participation in, further education and training for the labour force. Reports are available on Australia, Canada, the Netherlands, New Zealand, Sweden, and the United Kingdom.

NOTES AND REFERENCES

1 OECD/PEB *Towards a core information system?* by Martin Garden, Paris, 1986.

2 For a discussion of the briefing process see "The Alford Information Technology Centre" *Long-term perspectives 6,* by Joanna Eley, OECD/PEB, Paris 1989.

3 Taken from *Adaptability and flexibility in educational facilities* by Roger Clynes, OECD/PEB, Paris 1990.

4 For an illustration of a recently-built library in a post-compulsory institution see *Building Bulletin 68: Weald College, Harrow,* London 1989.

5 Department of Education and Science and Welsh Office *Managing colleges efficiently,* HMSO, London 1987.

6 OECD/PEB *The will to manage energy in schools* by John Onslow, Paris 1985.

7 OECD/PEB *Time for a change?* Paris 1988.

8 OECD/PEB *Schools as part of a network of learning facilities - implications for educational building* by John Mayfield, Paris 1987.

9 OECD/PEB *Computer technology in the planning and management of educational buildings* by Martine Bousquet and Bruno Lefèvre, Paris 1990.

10 The material in this paragraph is drawn from *Labour force statistics 1966-1986* (OECD Paris 1988).

11 The material in this paragraph is drawn from the *Employment outlook* (OECD Paris 1987).

12 OECD *Organisation and content of studies at the post-compulsory level* (SME/ET/87.15) together with country studies on: Canada (Quebec), France, Germany, Italy, Japan, the Netherlands, Sweden, Switzerland, United Kingdom (England and Wales), United Kingdom (Scotland), United States and Yugoslavia available on general distribution as OECD educational monographs.

13 OECD/PEB "Individual learning", *Long-term perspectives 4,* by Graham Parker, Paris 1987.

14 OECD *Education in OECD countries 1985-86: comparative statistics* Paris 1988.

15 For a fuller description of the secondary education complex at Golden Grove see *Long-term perspectives 5* "Golden Grove" by John Mayfield and Kelvin Trimper, OECD/PEB Paris 1989.

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